

AMENDMENT

U.S. Application No.: 10/088,229

Attorney Docket No.: Q61659

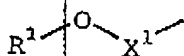
AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

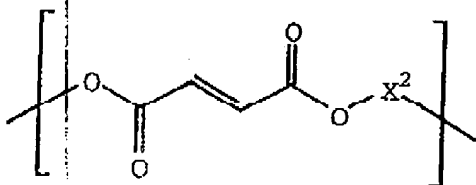
LISTING OF CLAIMS:

1. (original): A fumarate derivative having at least one group represented by formula (1) as the terminal groups and having two or more groups represented by formula (2) as a repeating unit:

Formula (1)



Formula (2)



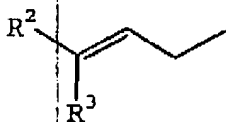
(wherein in formula (1), each R^1 independently represents formula (3) or (4), and in formula (1) or (2), X^1 and X^2 each independently represents an organic residue derived from a polyhydric alcohol having from 2 to 6 hydroxyl groups and 2 to 30 carbon atoms, provided that X^1 and X^2 may be ester-bonded to have a branched structure having a group represented by formula (1) as the terminal groups and having a group represented by formula (2) as a repeating unit);

AMENDMENT

U.S. Application No.: 10/088,229

Attorney Docket No.: Q61659

Formula (3)



(wherein R^2 and R^3 each independently represents hydrogen atom or an alkyl group having from 1 to 5 carbon atoms);

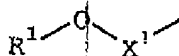
Formula (4)



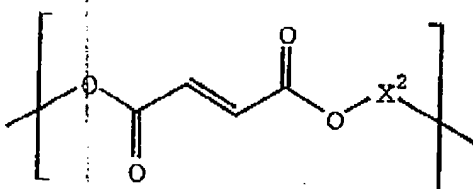
(wherein R^4 represents hydrogen atom or an alkyl group having from 1 to 11 carbon atoms).

2. (original): A fumarate derivative having at least one group represented by formula (1) as the terminal groups and having two or more groups represented by formula (2) and/or formula (5) as a repeating unit;

Formula (1)



Formula (2)

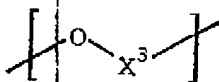


AMENDMENT

U.S. Application No.: 10/088,229

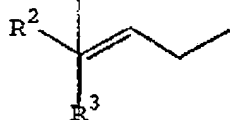
Attorney Docket No.: Q61659

Formula (5)



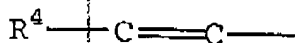
(wherein in formula (1), each R^1 independently represents formula (3) or (4), and in formulae (1), (2) and (5), X^1 , X^2 and X^3 each independently represents an organic residue derived from a polyhydric alcohol having from 2 to 6 hydroxyl groups and having from 2 to 30 carbon atoms, provided that X^1 , X^2 and X^3 may be ester-bonded and/or ether-bonded to have a branched structure having a group represented by formula (1) as the terminal groups and having a group represented by formula (2) and/or formula (5) as a repeating unit);

Formula (3)



(wherein R^2 and R^3 each independently represents hydrogen atom or an alkyl group having from 1 to 5 carbon atoms);

Formula (4)



(wherein R^4 represents hydrogen atom or an alkyl group having from 1 to 11 carbon atoms);

AMENDMENT

U.S. Application No.: 10/088,229

Attorney Docket No.: Q61659

3. (original): The fumarate derivative as claimed in claim 1 or 2, wherein the number of repetitions of the repeating unit represented by formula (2) is any one in the range from 2 to 10.

4. (currently amended): The fumarate derivative as claimed in claim 2-~~or~~3, wherein the number of repetitions of the repeating unit represented by formula (5) is any one in the range from 2 to 5.

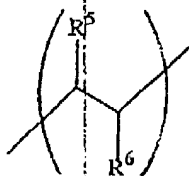
5. (currently amended): The fumarate derivative as claimed in any one of claims 1 to-4 2, wherein 80% or more of R¹ in formula (1) is formula (4).

6. (currently amended): The fumarate derivative as claimed in any one of claims 1 to-5 2, wherein R⁴ in formula (4) is any one selected from the group consisting of hydrogen atom, a methyl group, an ethyl group, an n-propyl group and an isopropyl group.

7. (currently amended): The fumarate derivative as claimed in any one of claims 1 to-6 2, wherein X¹, X² and X³ in formulae (1), (2) and (5) each independently is an organic residue derived from at least one alcohol selected from the group consisting of an alkylenc diol, an alicyclic diol and an aromatic diol.

8. (currently amended): The fumarate derivative as claimed in any one of claims 1 to-7 2, wherein the organic residue as claimed in claim 7 is represented by formula (6):

Formula (6)



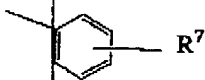
(wherein R⁵ and R⁶ each independently represents hydrogen atom or formula (7));

AMENDMENT

U.S. Application No.: 10/088,229

Attorney Docket No.: Q61659

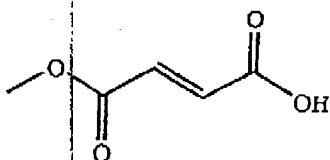
Formula (7)



(wherein R^7 represents hydrogen atom or an alkyl group having from 1 to 3 carbon atoms).

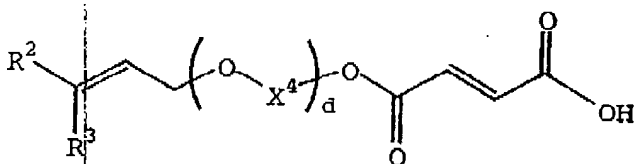
9. (currently amended): The fumarate derivative as claimed in any one of claims 1 to 8, wherein at least one terminal group is a group represented by formula (8):

Formula (8)



10. (original): The fumarate derivative, which is represented by formula (9):

Formula (9)



(wherein each X^4 , which is present in the number of d in formula (9), independently represents an alkylene group or a cycloalkylene group having from 5 to 12 carbon atoms, d

AMENDMENT

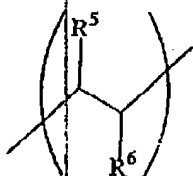
U.S. Application No.: 10/088,229

Attorney Docket No.: Q61659

represents an integer of 1 to 5, and R^2 and R^3 each independently represents hydrogen atom or an alkyl group having from 1 to 5 carbon atoms).

11. (currently amended): The fumarate derivative as claimed in claim 10, wherein X^4 in formula (9) is an alkylene group represented in formula (6):

Formula (6)



(wherein R^5 and R^6 each independently represents hydrogen atom or formula (7));

Formula (7)



(wherein R^7 represents hydrogen atom or an alkyl group having from 1 to 3 carbon atoms).

12. (currently amended): The fumarate derivative as claimed in any one of claims 1 to 9 2, wherein at least one terminal group is a hydroxyl group.

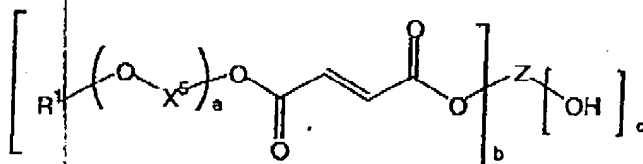
13. (original): The fumarate derivative, which is represented by formula (10):

Formula (10)

AMENDMENT

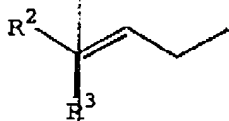
U.S. Application No.: 10/088,229

Attorney Docket No.: Q61659



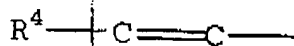
(wherein Z represents an organic residue derived from a tri-, tetra-, penta- or hexa-hydric alcohol, R^1 independently represents formula (3) or formula (4), each X^5 , which is present in the number of a in formula (10), independently represents an alkylene group or a cycloalkylene group having from 5 to 12 carbon atoms, a represents an integer of 1 to 5, b represents an integer of 1 to 6, c represents an integer of 0 to 5, and b+c is from 3 to 6);

Formula (3)



(wherein R^2 and R^3 each independently represents hydrogen atom or an alkyl group having from 1 to 5 carbon atoms);

Formula (4)



(wherein R^4 represents hydrogen atom or an alkyl group having from 1 to 11 carbon atoms).

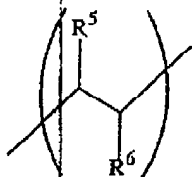
14. (currently amended): The fumarate derivative as claimed in claim 13, wherein X^5 in formula (10) is an alkylene group represented in formula (6):

AMENDMENT

U.S. Application No.: 10/088,229

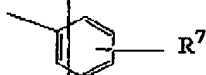
Attorney Docket No.: Q61659

Formula (6)



(wherein R⁵ and R⁶ each independently represents hydrogen atom or formula (7));

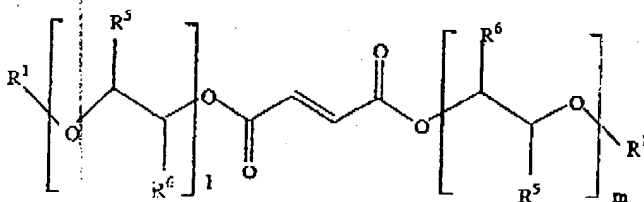
Formula (7)



(wherein R⁷ represents hydrogen atom or an alkyl group having from 1 to 3 carbon atoms).

15. (original): The fumarate derivative, which is represented by formula (11):

Formula (11)



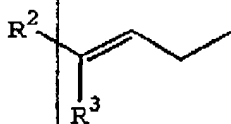
(wherein, R¹ independently represents formula (3) or formula (4), and l and m each independently represents an integer of 1 to 5);

Formula (3)

AMENDMENT

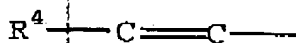
U.S. Application No.: 10/088,229

Attorney Docket No.: Q61659



(wherein R^2 and R^3 each independently represents hydrogen atom or an alkyl group having from 1 to 5 carbon atoms);

Formula (4)



(wherein R^4 represents hydrogen atom or an alkyl group having from 1 to 11 carbon atoms);

(wherein R^5 and R^6 each independently represents hydrogen atom or formula (7));

Formula (7)



(wherein R^7 represents hydrogen atom or an alkyl group having from 1 to 3 carbon atoms).

16. (withdrawn): A method for producing a fumarate derivative as claimed in any one of claims 1 to 9 and claim 12, comprising reacting a fumarate derivative having at least one formula (8) in the terminal groups and having two or more groups represented by formula (2) as a repeating unit with a polyhydric alcohol having from 2 to 6 hydroxyl groups and having from 2 to 30 carbon atoms in the presence of a catalyst.

AMENDMENT

U.S. Application No.: 10/088,229

Attorney Docket No.: Q61659

17. (withdrawn): A method for producing a fumarate derivative as claimed in claim 13 or 14, comprising reacting a fumarate derivative having at least one group represented by formula (8) in the terminal groups with a polyhydric alcohol having from 2 to 6 hydroxyl groups and having from 2 to 30 carbon atoms in the presence of a catalyst.

18. (withdrawn): A method for producing a fumarate derivative as claimed in any one of claims 1 to 9 and claim 12, comprising reacting a fumarate derivative having at least one group represented by formula (8) in the terminal groups and having two or more groups represented by formula (2) as a repeating unit with a polyhydric alcohol having from 2 to 6 hydroxyl groups and having from 2 to 30 carbon atoms in the presence of a condensing agent and a base.

19. (withdrawn): A method for producing a fumarate derivative as claimed in claim 13 or 14, comprising reacting a fumarate derivative having at least one group represented by formula (8) in the terminal groups with a polyhydric alcohol having from 2 to 6 hydroxyl groups and having from 2 to 30 carbon atoms in the presence of a condensing agent and a base.

20. (withdrawn): A method for producing a fumarate derivative as claimed in claims 18 and 19, wherein the condensing agent is sulfonyl chloride.

21. (withdrawn): The method for producing a fumarate derivative as claimed in any one of claims 16 to 20, wherein the polyhydric alcohol having from 2 to 6 hydroxyl groups and having from 2 to 30 carbon atoms is at least one selected from the group consisting of trimethylolpropane, trimethylolethane, pentaerythritol, ditrimethylolpropane, dipentaerythritol and adducts thereof with an ethylene oxide or a propylene oxide.

AMENDMENT

U.S. Application No.: 10/088,229

Attorney Docket No.: Q61659

22. (withdrawn): A method for producing a fumarate derivative having formula (4) in the terminal groups, comprising isomerizing terminal groups of a fumarate derivative having formula (3) as the terminal groups in the presence of a catalyst to convert said terminal groups into formula (4).

23. (withdrawn): The method for producing a fumarate derivative having formula (4) in the terminal groups as claimed in claim 22, wherein the fumarate derivative having formula (3) as the terminal groups is the fumarate derivative described in any one of claims 1 to 15.

24. (withdrawn): The method for producing a fumarate derivative having formula (4) in the terminal groups as claimed in claim 22 or 23, wherein 80% or more of the fumarate derivative having formula (3) as the terminal groups is converted into formula (4) by the isomerization reaction.

25. (withdrawn): The method for producing a fumarate derivative having formula (4) in the terminal groups as claimed in claim 22 or 23, wherein the catalyst used for the isomerization reaction is a catalyst containing at least one of palladium, rhodium and ruthenium.

26. (currently amended): A polymerizable composition comprising the fumarate derivative as claimed in any one of claims 1 to ~~15~~ 2.

27. (withdrawn): The polymerizable composition as claimed in claim 26, which comprises:

from 1 to 99% by mass of the fumarate derivative described in any one of claims 1 to 15,
and

AMENDMENT

U.S. Application No.: 10/088,229

Attorney Docket No.: Q61659

from 1 to 99% by mass of at least one compound selected from the group consisting of an unsaturated polyester, an oligomer having (meth)acrylate group and a radical polymerizable monomer.

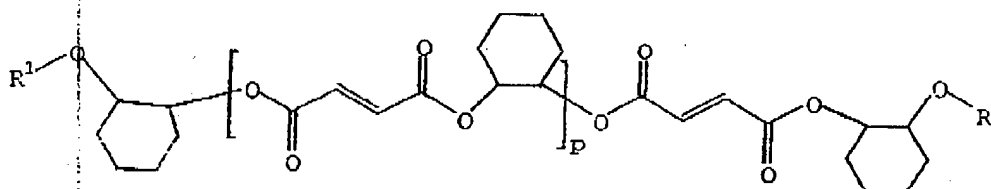
28. (currently amended): A polymerizable composition comprising:

100 parts by mass of the polymerizable composition described in claim 26 ~~or~~ 27, and from 0.01 to 15 parts by mass of a radical polymerization initiator.

29. (currently amended): A cured product obtained by curing the polymerizable composition as claimed in claim 26 to 28.

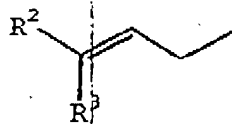
30. (original): The fumarate derivative, which is represented by formula (25):

Formula (25)



(wherein, R¹ independently represents formula (3) or formula (4), and p represents an integer of 1 to 9);

Formula (3)



(wherein R² and R³ each independently represents hydrogen atom or an alkyl group having from 1 to 5 carbon atoms);

AMENDMENT

U.S. Application No.: 10/088,229

Attorney Docket No.: Q61659

Formula (4)



(wherein R^4 represents hydrogen atom or an alkyl group having from 1 to 11 carbon atoms).